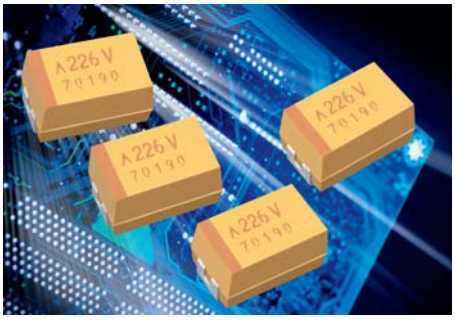
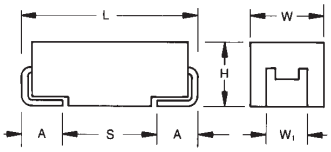
TCS Series

COTS-Plus Polymer Solid Electrolytic Multianode Capacitor





FEATURES

- Robust design for long operation lifetime
- Volumetric efficiency
- AVX Q-process with statistical screening
- 100% Accelerated Ageing
- Surge testing level option
- Improved basic reliability 0.5%/1000hrs
- Humidity 85°C/85%RH, Vr, 500 hours
- - 55 to +125°C operation temperature
- Shock and Vibration by MIL-STD-202
- DCL 0.1 CV
- Low ESR
- 3x reflow 260°C compatible
- High frequency capacitance retention
- Benign failure mode under recommended use conditions

LEAD-FREE
LEAD-FREE COMPATIBLE COMPONENT

RoHS COMPLIANT

For RoHS compliant products, please select correct termination style.

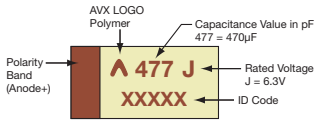
APPLICATIONS

- Long life time DC/DC converter applications in Telecommunications, Industrial, Avionics.

For additional information on Q-process please consult the AVX technical publication "Reaching the Highest Reliability for Tantalum Capacitors" (see the link: http://www.avx.com/docs/techinfo/Qprocess.pdf)

MARKING

E CASE



CASE DIMENSIONS: millimeters (inches)

Code	EIA Code	EIA Metric	L±0.20 (0.008)	W+0.20 (0.008) -0.10 (0.004)	H+0.20 (0.008) -0.10 (0.004)	W_1±0.20 (0.008)	A+0.30 (0.012) -0.20 (0.008)	S Min.
E	2917	7343-43	7.30 (0.287)	4.30 (0.169)	4.10 (0.162)	2.40 (0.094)	1.30 (0.051)	4.40 (0.173)
W1 dimension applies to the termination width for A dimensional area only.								

HOW TO ORDER

TCS	E	477	M	006	C	□	S	Z	0	^	00
Type	**Case Size** See table above	**Capacitance Code** pF code: 1st two digits represent significant figures, 3rd digit represents multiplier (number of zeros to follow)	**Tolerance** M = ±20%	**Rated DC Voltage** 002 = 2.5Vdc 004 = 4Vdc 006 = 6.3Vdc 010 = 10Vdc 016 = 16Vdc 035 = 35Vdc	**ESR** C = Std ESR L = Low ESR	**Packaging** R = 7" T&R S = 13" T&R	**Inspection Level** S = Standard Conformance	**Reliability Grade** Z = Non-ER	**Qualification Level** 0 = N/A	**Termination Finish** 7 = 100% Tin H = Sn/Pb Non RoHS	**Surge Test Option** 00 = Standard 23 = 10x Cycles, 25°C 24* = 10x Cycles, -55°C & +85°C

*Please contact AVX for Surge option

TECHNICAL SPECIFICATIONS

Technical Data:	All technical data relate to an ambient temperature of +25°C
Capacitance Range:	33 µF to 1000 µF
Capacitance Tolerance:	±20%
Leakage Current DCL:	0.1CV
Temperature Range:	-55°C to +125°C
Reliability:	0.5% per 1000 hours at 85°C, V_R with 0.1Ω/V series impedance, 60% confidence level
Termination Finish:	Sn Plating or SnPb Plating (Non RoHS)

NOTE: Conductive Polymer Capacitors are designed to operate within the limits of the environmental conditions specified for each series. If operated continuously at their maximum temperature and / or humidity limit, or beyond these limits, capacitors may exhibit a parametric shift in capacitance and increases in ESR. These changes may occur earlier if the specified environmental conditions are exceeded. Similarly, their normal operational time period will be significantly extended if their general duty cycle includes operation below maximum temperature within humidity controlled environments. Careful attention should be paid to maximum temperature with associated high humidity environments as well as voltage derating, ripple current and current surges. Please reference the AVX Conductive Polymer Capacitor Guidelines for more information or contact factory for application assistance.

TCS Series

COTS-Plus Polymer Solid Electrolytic Multianode Capacitor

CAPACITANCE AND RATED VOLTAGE RANGE (LETTER DENOTES CASE SIZE)

Capacitance		Rated Voltage DC (V_R)							
µF	Code	2.5 (e)	4V (G)	6.3V (J)	10V (A)	16V (C)	20 (D)	25V (E)	35V (V)
22	226								
33	336								E(45)*
47	476								E(60)*
68	686								
100	107								
150	157								
220	227					E(25)*			
330	337				E(12)*	E(25)*			
470	477			E(12)					
680	687								
1000	108	E(12)	E(12)						

Available Ratings, (ESR ratings in mOhms in brackets)

Engineering samples - please contact manufacturer

*Codes under development – subject to change

Note: Voltage ratings are minimum values. AVX reserves the right to supply higher ratings in the same case size, to the same reliability standards.

RATINGS & PART NUMBER REFERENCE

AVX Part No.	Case Size	Capacitance (µF)	Rated Voltage (V)	Maximum Operating Temperature (°C)	DCL Max. (µA)	DF Max. (%)	ESR Max @ 100kHz (mΩ)	MSL	100kHz RMS Current (mA)			
									45°C	85°C	105°C	125°C
2.5 Volt												
TCSE108M002C□SZ0^00	E	1000	2.5	125	250	8	12	3	5800	4100	2600	1500
TCSE108M002C□SZ0^23	E	1000	2.5	125	250	8	12	3	5800	4100	2600	1500
4 Volt												
TCSE108M004C□SZ0^00	E	1000	4	125	400	8	12	3	5800	4100	2600	1500
TCSE108M004C□SZ0^23	E	1000	4	125	400	8	12	3	5800	4100	2600	1500
6.3 Volt												
TCSE477M006C□SZ0^00	E	470	6.3	125	296	8	12	3	5800	4100	2600	1500
TCSE477M006C□SZ0^23	E	470	6.3	125	296	8	12	3	5800	4100	2600	1500

Moisture Sensitivity Level (MSL) is defined according to J-STD-020.

All technical data relates to an ambient temperature of +25°C. Capacitance and DF are measured at 120Hz, 0.5RMS with DC bias of 2.2 volts. DCL is measured at rated voltage after 5 minutes.

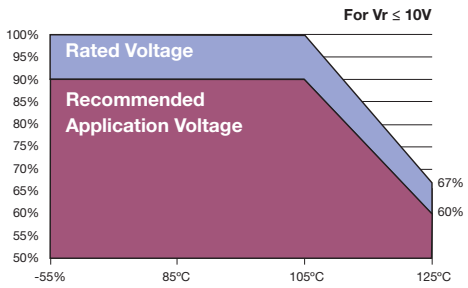
ESR allowed to move up to 1.25 times catalog limit post mounting.

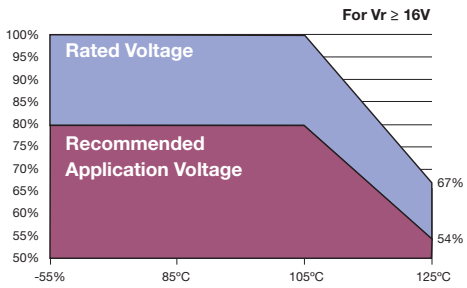
NOTE: AVX reserves the right to supply a higher voltage rating or tighter tolerance part in the same case size, to the same reliability standards.

RECOMMENDED DERATING FACTOR

Voltage and temperature derating as percentage of Vr.

Rated voltage	Operating Temperature		
	≤85°C	105°C	125°C
≤10V	90%	90%	60%
≥16V	80%	80%	54%





QUALIFICATION TABLE

TEST	TCS COST-Plus series (Temperature range -55ºC to +125ºC)		
	Condition	Characteristics	
Endurance	Determine after application of rated voltage for 2000 +48/-0 hours at 105±2ºC. Also determine after application of 125ºC temperature, 2/3 rated voltage for 2000 +48/-0 hours. After test leaving 1-2 hours at room temperature. Power supply impedance to be ≤0.1Ω/V.	Visual examination	no visible damage
		DCL	1.25 x initial limit
		ΔC/C	within +20/-30% of initial value
		DF	1.5 x initial limit
		ESR	2 x initial limit
Storage Life	125ºC, 0V, 2000h	Visual examination	no visible damage
		DCL	2 x initial limit
		ΔC/C	within ±20% of initial value
		DF	1.5 x initial limit
		ESR	2 x initial limit
Biased Humidity	Determine after leaving for 500 or 1000 hours at 85±2ºC, 85% relative humidity and rated voltage and then recovery 1-2 hours at room temperature.	Visual examination	no visible damage
		DCL	3 x initial limit
		ΔC/C	within +30/-20% of initial value
		DF	1.5 x initial limit
		ESR	2 x initial limit

Temperature Stability

Step	Temperature°C	Duration(min)
1	+20±2	15
2	-55+0/-3	15
3	+20±2	15
4	+85+3/-0	15
5	+125+3/-0	15
6	+20±2	15

	+20ºC	-55ºC	+20ºC	+85ºC	+125ºC	+20ºC
DCL	IL*	n/a	IL*	10 x IL*	12.5 x IL*	IL*
ΔC/C	n/a	+0/-20%	±5%	+20/-0%	+30/-0%	±5%
DF	IL*	1.5 x IL*	IL*	1.5 x IL*	2 x IL*	IL*

Surge Voltage	Test temperature: 125ºC+3/0ºC Surge voltage: 1.3 x 2/3 rated voltage Charge/Discharge resistance: 1000±100Ω Number of cycles: 1000x Cycle duration: 6 min; 30 sec charge, 5 min 30 sec discharge	Visual examination	no visible damage
		DCL	initial limit
		ΔC/C	within +20/-30% of initial value
		DF	1.25 x initial limit
		ESR	1.25 x initial limit
Mechanical Shock/Vibration	MIL-STD-202, Method 213, Condition I, 100 G peak MIL-STD-202, Method 204, Condition D, 10 Hz to 2,000 Hz, 20 G peak	Visual examination	no visible damage
		DCL	initial limit
		ΔC/C	within ±10% of initial value
		DF	initial limit
		ESR	1.25 x initial limit

*Initial Limit

For use outside of recommended conditions and special request, please contact manufacturer.
Initial measurement max. 1hr after the removal from dry pack or after pretreatment at 85°C for 24 hours.